Listing and Amendments to the Claims

This listing of claims will replace the claims that were published in the PCT Application and annexed to the International Preliminary Report on Patentability:

1. (currently amended) Method for transmitting watermark data bits ~~(IWATD)~~ using a spread spectrum, said method including the steps:
- modulating ~~(BVMOD)~~ said watermark data bits on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~;
- transforming ~~(WATSE)~~ said modulated encoder pseudo-noise sequence ~~(WATS)~~ into the frequency domain and shaping it in amplitude according to the masking level curve of an audio signal together with which the watermark data bit information is to be transmitted or transferred, and transforming ~~(WATSE)~~ said shaped encoder pseudo-noise frequency domain sequence back into the time domain;
- combining ~~(WATSE)~~ said inverse transformed encoder pseudo-noise frequency domain sequence with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ is one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ are used per audio signal frame for carrying out said combining for corresponding sections of said current frame;
- transmitting or transferring ~~(TRM)~~ said combined current audio signal frame carrying said watermark data bits.

2. (currently amended) Method for regaining watermark data bits ~~(IWATD)~~ embedded in a spread spectrum, whereby the corresponding original watermark data bits were modulated ~~(BVMOD)~~ at encoder side on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ and said modulated encoder pseudo-noise sequence ~~(WATS)~~ was transformed ~~(WATSE)~~ into the frequency domain and shaped in amplitude according to the masking level curve ~~(PSYMC)~~ of an audio signal together with which the watermark data bit information was transmitted or transferred ~~(TRM)~~, and said shaped encoder pseudo-noise frequency domain

sequence was transformed ~~(WATSE)~~ back into the time domain and was combined with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ was one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ were used per audio signal frame for carrying out said combining for corresponding sections of said current frame,

said method including the steps:

- receiving ~~(REC, SYNC)~~ and synchronising said transmitted or transferred audio signal;
- convolving ~~(DRECMF)~~ each one of a corresponding section of said current frame of data of said audio signal with the corresponding one of time-inversed versions ~~(DECPNSEQ)~~ of the N orthogonal encoder pseudo-noise sequences;
- determining ~~(DRECMF)~~, for each one of said sections, from the sign of the peak or peaks of the corresponding convolution result the value of a bit of said watermark data ~~(OWATD)~~.

3. (currently amended) Method for regaining watermark data bits ~~(IWATD)~~ embedded in a spread spectrum, whereby the corresponding original watermark data bits were modulated ~~(BVMOD)~~ at encoder side on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ and said modulated encoder pseudo-noise sequence ~~(WATS)~~ was transformed ~~(WATSE)~~ into the frequency domain and shaped in amplitude according to the masking level curve ~~(PSYMC)~~ of an audio signal together with which the watermark data bit information was transmitted or transferred ~~(TRM)~~, and said shaped encoder pseudo-noise frequency domain sequence was transformed ~~(WATSE)~~ back into the time domain and was combined with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ was one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ were used per audio signal frame for carrying out said combining for corresponding sections of said current frame,

said method including the steps:

- receiving ~~(REC, SYNC)~~ and synchronising said transmitted or transferred audio signal;
- determining ~~(EDET)~~ in the received audio signal one or more echoes and the related echo delays;
- assembling together the N time-inversed versions of said orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ for a current frame and constructing a modified decoder pseudo-noise sequence ~~(MDECPNSEQ)~~ based on the time-inversed version of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ whereby, according to the echo delay or delays determined, correspondingly time-shifted versions of said time-inversed encoder pseudo-noise sequence are combined in order to construct said modified decoder pseudo-noise sequence;
- convolving ~~(DRECMF)~~ each one of a corresponding section of said current audio signal frame with the corresponding section of said modified decoder pseudo-noise sequence ~~(MDECPNSEQ)~~;
- determining ~~(DRECMF)~~, for each one of said sections, from the sign of the peak or peaks of the corresponding convolution result the value of a bit of said watermark data ~~(OWATD)~~.

4. (currently amended) Method according to claim 3 wherein, when determining ~~(EDET)~~ in the received audio signal one or more echoes and the related echo delays, the results for several audio frames are evaluated before a final result on the echo delay is formed.

5. (currently amended) Apparatus for transmitting watermark data bits ~~(IWATD)~~ using a spread spectrum, said apparatus including:
- means ~~(BVMOD)~~ for modulating said watermark data bits on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~;
- means ~~(WATSE)~~ for transforming said modulated encoder pseudo-noise sequence ~~(WATS)~~ into the frequency domain and for shaping it in amplitude according to the masking level curve of an audio signal together with which the watermark data bit information is to be transmitted or transferred, and for transforming said shaped encoder pseudo-noise frequency domain sequence back into the time domain;

- means ~~(WATSE)~~ for combining said inverse transformed encoder pseudo-noise frequency domain sequence with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ is one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ are used per audio signal frame for carrying out said combining for corresponding sections of said current frame;
- means ~~(TRM)~~ for transmitting or transferring said combined audio signal frame or frames carrying said watermark data bits.

6. (currently amended) Apparatus for regaining watermark data bits ~~(IWATD)~~ embedded in a spread spectrum, whereby the corresponding original watermark data bits were modulated ~~(BVMOD)~~ at encoder side on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ and said modulated encoder pseudo-noise sequence ~~(WATS)~~ was transformed ~~(WATSE)~~ into the frequency domain and shaped in amplitude according to the masking level curve ~~(PSYMC)~~ of an audio signal together with which the watermark data bit information was transmitted or transferred ~~(TRM)~~, and said shaped encoder pseudo-noise frequency domain sequence was transformed ~~(WATSE)~~ back into the time domain and was combined with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ was one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ were used per audio signal frame for carrying out said combining for corresponding sections of said current frame,

said apparatus including:

- means ~~(REC, SYNC)~~ for receiving and synchronising said transmitted or transferred audio signal;
- means ~~(DRECMF)~~ for convolving each one of a corresponding section of said current frame of data of said audio signal with the corresponding one of time-inversed versions ~~(DECPNSEQ)~~ of the N orthogonal encoder pseudo-noise sequences, and for determining, for each one of said sections, from the sign of the peak or peaks of the corresponding convolution result the value of a bit of said watermark data ~~(OWATD)~~.

7. (currently amended) Apparatus for regaining watermark data bits ~~(IWATD)~~ embedded in a spread spectrum, whereby the corresponding original watermark data bits were modulated ~~(BVMOD)~~ at encoder side on an encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ and said modulated encoder pseudo-noise sequence ~~(WATS)~~ was transformed ~~(WATSE)~~ into the frequency domain and shaped in amplitude according to the masking level curve ~~(PSYMC)~~ of an audio signal together with which the watermark data bit information was transmitted or transferred ~~(TRM)~~, and said shaped encoder pseudo-noise frequency domain sequence was transformed ~~(WATSE)~~ back into the time domain and was combined with a current frame of data of said audio signal, wherein the length of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ was one Nth of the length of said audio signal frame, N being an integer number greater one, and wherein N orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ were used per audio signal frame for carrying out said combining for corresponding sections of said current frame

said apparatus including:

- means ~~(REC, SYNC)~~ for receiving and synchronising said transmitted or transferred audio signal;
- means ~~(EDET)~~ for determining in the received audio signal one or more echoes and the related echo delays, and for assembling together the N time-inversed versions of said orthogonal encoder pseudo-noise sequences ~~(ENCPNSEQ)~~ for a current frame and for constructing a modified decoder pseudo-noise sequence ~~(MDECPNSEQ)~~ based on the time-inversed version of said encoder pseudo-noise sequence ~~(ENCPNSEQ)~~ whereby, according to the echo delay or delays determined, correspondingly time-shifted versions of said time-inversed encoder pseudo-noise sequence are combined in order to construct said modified decoder pseudo-noise sequence;
- means ~~(DRECMF)~~ for convolving said current frame of data of said audio signal with said modified decoder pseudo-noise sequence ~~(MDECPNSEQ)~~, and for determining, for each one of said sections, from the sign of the peak or peaks of the corresponding convolution result the value of a bit of said watermark data ~~(OWATD)~~.

8. (currently amended) Apparatus according to claim 7 wherein, in said determining means ~~(EDET)~~, in the received audio signal one or more echoes and the related echo delays, the results for several audio frames are evaluated before a final result on the echo delay is formed.